ABSTRACT

THESIS: CARDIOPULMONARY RESPONSES TO EXERCISE IN INDIVIDUALS WITH METABOLIC SYNDROME

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PAGES: 48

The metabolic syndrome (MetSyn) is a condition characterized by the clustering of risk factors associated with cardiovascular disease (CVD) that afflicts 50 million Americans. A wealth of literature has demonstrated the prognostic, diagnostic, and interventional use of cardiopulmonary exercise testing (CPET) in individuals with chronic disease. However, there is limited information on how MetSyn may alter cardiopulmonary responses to exercise; thus, the purpose of this study is to identify whether cardiopulmonary variables derived from CPET are altered in MetSyn. MetSyn was defined using the NCEP definition which includes central obesity, elevated fasting plasma triglycerides, low high-density lipoprotein cholesterol, elevated fasting plasma glucose, hypertension, or pharmacologic treatment for diagnosed hypertension, hypertriglyceridemia, or low HDL-C. A cohort of 3,181 participants (1,714 men, 1,467 women), age 20 to 79 years (43.8±12 years) completed CPET and metabolic risk factor assessment between January 1, 1971 and November 1, 2020. Cardiopulmonary variables assessed included: cardiorespiratory fitness (CRF) defined as the maximum volume of oxygen uptake (VO_{2max}), ventilatory threshold (VO_2@ VT), oxygen uptake

efficiency slope (OUES), the ratio of ventilation to VO_2 at peak exercise (peak VE/VO_2) and the VE/VCO_{2slope}. VO_{2max}, RER_{max}, HR_{max}, VO_2@VT, $OUES_{norm}$, and peak VE/VO_2 were altered in the MetSyn ($P<0.05$). Logistic regression analysis revealed that VO_{2max}, VO_2 @VT, $OUES_{norm}$, and peak VE/VO_2 were all predictive of MetSyn ($P<0.05$). Cardiopulmonary responses to exercise were altered in individuals with MetSyn and several variables were predictive of MetSyn. Thus, lower cardiopulmonary response may have prognostic utility for identifying individuals at high risk of developing MetSyn or in determining the MetSyn severity.